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Analysis of Positively Charged Muonium and its Diffusion in Cadmium Oxide

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Cadmium oxide is a transparent conducting oxide (TCO) that has many applications in optoelectronic devices, such as solar cells, photo transistors and diodes. CdO is a naturally n-type TCO with hydrogen acting as a shallow donor. μ SR zero field measurements were collected, from 20 K to 800 K, to investigate the diffusion properties of positive μ defects in a CdO powder sample. The neutral μ shallow donor signal is seen up to 200 K. At this temperature the neutral μ ionizes. The calculated ionization energy is 119 meV \pm 20 meV. This result is in agreement with Cox, et. al. [*J. Phys.: Condens. Matter* **18**, 1061 (2006)]. Two positive μ sites are seen below 425 K. Above 425 K, one of the positive μ sites becomes mobile and transitions to the second positive μ site. By 550 K, all positive μ have transitioned to the second site. Details relating to the transition between sites, barrier energies, and diffusion processes will be discussed in the presentation.

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